

Studies on Synchronization of Flowering in the Parental Lines of Shaktiman-1 Maize Hybrid

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Maize is a highly potential crop for grain yield. The major factor limiting productivity of this crop is the use of local open pollinated varieties, and this is primarily due to non availability of quality seed of high yielding hybrid varieties, at affordable cost and at right time. This call for an immediate development of hybrid seed production programme specially for N-W to N-E Indian zone which constitute about 92 per cent of total maize grown area.

For successful hybrid seed production programme, the following factors which must be taken in to considerations are (i) synchronization of flowering of parental lines (ii) effective pollination of the seed parent by the pollinator (iii) prevention of the contamination of the seed plot from foreign pollen (iv) seed development and maturation under ideal condition (v) timely harvesting and shelling of seed and (vi) processing and storage of seed to maintain high viability and vigour. Among them, the most important factor which determines the hybrid seed production is synchronization of flowering of male and female parents. In other words for the effective seed set on seed parent, the stage of stigma receptivity should coincide with the stage of anthesis of the pollinator parent. Non-synchrony of flowering of parental lines is primarily due to inherent difference in the flowering of the parental lines. Parental lines of Shaktiman-1 maize hybrid lack synchrony of flowering i.e. male parent flowers earlier than the female parent, which affects the

productivity of hybrid seed adversely. Therefore, an experiment was planned with the different treatment combination to assess their effect on the synchrony of flowering of male and female parents of Shaktiman-1 maize hybrid.

Seed hydration and GA₃ soaking was found beneficial in improving field emergence, seedling growth and in achieving synchrony of flowering in parental lines of maize hybrid [1, 2, 3]. Foliar spray of urea and staggered sowing played key role in synchronization of flowering [2, 5]. The present study was conducted to evaluate the effect of hydropriming, GA₃ soaking, urea spray, and staggered planting on synchrony of flowering in the parental lines of Shaktiman-1 maize hybrid.

Healthy and uniform seeds of male (CML-186) and female (CML-142 x CML-150), of three way cross maize hybrid Shaktiman-1 were obtained from Dholi farm of Rajendra Agricultural University, Pusa and were subjected to 8 treatment combinations viz. T₁ = control (untreated), T₂ = spraying of urea (2%) on female parent at 30 DAS, T₃ = spraying of urea (2%) on female parent at 30+45 DAS, T₄ = soaking seed of both male and female parents in water for 20 h followed by drying in shade for 24 h, T₅ = soaking seed of female parent in water for 20 h followed by drying in shade for 24 h, T₆ = sowing of male parent 2 days later than the female parent, T₇ = sowing of male parent 4 days later than the female parent and T₈ = soaking seed of female parent in 100 ppm GA₃

solution for 24 h. The experiment was conducted during *kharif* 2003, the sowing of experiment was done on 18.06.2003 in RBD with three replications with plot size of 1.8 x 5 m². Each treatment consisted of three rows (1 row of male and 2 rows of female parent) of 5m length spaced 60cm apart. The meteorological data during crop period is presented in Table 2. Recommended agronomic practices were followed to raise the crop. Detasselling of female parent was done very carefully. Observations on flowering behaviour of both the parent were critically recorded on plot basis. The analysis of variance indicated that the treatment differences were highly significant for the characters like days to 50 and 100 per cent silking in female parent, days to tassel initiation, 50 and 100 per cent tasselling in male parent. While it was significant for the characters like days to silk initiation in female parent, seed yield (g)/plant and seed yield (kg/ha). A perusal of results on silk emergence in female parent revealed that different treatments influenced silk emergence differently (Table 1). The no. of days required for silk initiation (48.66 days) and 50 per cent (56.00 days) silking was found to be minimum in

treatment T₈, whereas days to 100 per cent silking was found to be minimum (61.00 days) in both treatment T₈ and T₃. The result clearly indicated that the days required for 100 per cent silking was reduced by 2.66 days in treatment T₈ and T₃ as compared to control. The results are in accordance with Brenticus [6] and Patil [7]. The other treatments like urea spray at 30 DAS (T₂) and seed hydration for 20 hr (T₄ and T₅) were also found to induce earliness in the female parent (late parent). Data on tassel emergence in male also revealed that different treatments influenced tassel emergence differently (Table 1). The number of days recorded for tassel initiation (53.00 days), 50 (60.66 days) and 100 per cent (64.00 days) tasselling was maximum in treatment T₇ followed by treatment T₆. The respective value for treatment T₆ were found to be 51.33, 59.00 and 62.66 days respectively. The data presented above clearly indicated that the days required for 100 per cent tasselling in treatment T₇ and T₆ exceeded by 4.67 and 3.33 days respectively as compared to control. It was further observed that the difference between 100 per cent silking and tasselling in control plot

Table 1. Effect of treatments on silking and tasselling of parental lines of Shaktiman-I maize hybrid

Treatment	Characters						
	Days to silk initiation	Days to 50% silking	Days to 100% silking	Days to tassel initiation	Days 50% tasselling	Days 100% tasselling	Seed yield (kg/ha)
T	51.66	59.66	63.66	47.66	56.00	59.33	2648.66
T ₂	50.66	58.00	62.00	48.00	56.33	60.00	3151.33
T ₃	50.00	57.66	61.00	47.66	56.33	59.66	3419.66
T ₄	49.66	57.66	61.66	47.00	54.33	58.30	2941.33
T ₅	50.00	57.33	61.66	48.00	56.00	60.00	3299.66
T ₆	51.66	59.66	63.33	51.33	59.00	62.66	3545.33
T ₇	51.00	59.33	63.33	53.00	60.66	64.00	3412.00
T ₈	48.66	56.00	61.00	47.66	55.66	59.60	3301.06
SEm±	0.46	0.24	0.24	0.50	0.40	0.41	
CD (P=0.05)	1.40	0.73	0.75	1.52	1.22	1.27	

Table 2. Meteorological data during cropping season (Kharif 2003)

Months	Max. temp. (°C)			Min. temp. (°C)			Rainfall (mm)			Relative humidity (%)					
										0700 hrs			1400 hrs		
	Actual	Normal	DN*	Actual	Normal	DN*	Actual	Normal	DN*	Actual	Normal	DN*	Actual	Normal	DN*
June 03	33.9	35.5	-1.6	24.8	24.6	0.2	215	153.4	61.6	80.0	87.0	-7.0	80.8	54.0	1.2
July 03	32.4	32.5	-0.1	25.3	24.1	1.2	263	346.2	-83.2	87.5	91.0	-3.5	71.0	69.0	2.0
Aug. 03	33.3	32.6	0.7	25.9	24.0	1.9	596	294.9	301.1	87.8	90.0	-1.2	68.0	69.0	-1.0
Sept. 03	32.6	32.3	0.3	25.1	23.6	1.5	124	233.8	-109.8	89.3	89.0	0.3	80.8	67.0	13.8

Actual : Recorded during experimental period; Normal: Average of last ten years; DN*: Deviation from normal.

was 4.33-days whereas this difference was only 0.67 days (63.33 days silking -62.66 days tasseling) in treatment T_6 , which clearly reflected that delayed sowing of male parent two days later than the female parent narrowed the gap between silking and tasseling by 3.66 days as compared to control. These findings are in accordance with the results of Patil [7] and Sivappa [5]. Thus on the basis of the results, it can be inferred that among all treatments, treatment sowing of male parent 2 days later than the female parent (T_6) was found to be the best in inducing synchrony of flowering between parental lines of Shaktiman-1 maize hybrid. This treatment not only narrowed the gap between silking and tasseling but also influenced seed yield positively. The highest seed yield (3545 kg/ha) was recorded in T_6 . The better synchrony of flowering between male and female parent due to delayed sowing of male parent by 2 days later than the female parent may be the main cause of increased seed yield. The data presented in Table 1, further revealed that treatment T_3 [foliar spray of urea (2%) after 30 & 45 DAS] was the second best treatment in inducing synchrony of flowering because the seed yield and other parameters of this treatment were found to be better than other treatments except T_6 .

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